Complete Summary

GUIDELINE TITLE

Practice parameter: diagnostic assessment of the child with status epilepticus (an evidence-based review).

BIBLIOGRAPHIC SOURCE(S)

Riviello JJ Jr, Ashwal S, Hirtz D, Glauser T, Ballaban-Gil K, Kelley K, Morton LD, Phillips S, Sloan E, Shinnar S, American Academy of Neurology Subcommittee, Practice Committee of the Child Neurology Society. Practice parameter: diagnostic assessment of the child with status epilepticus (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. Neurology 2006 Nov 14;67(9):1542-50. [64 references] PubMed

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Status epilepticus

GUIDELINE CATEGORY

Diagnosis
Evaluation

CLINICAL SPECIALTY

Neurology
Pediatrics

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

To review evidence on the assessment of the child with status epilepticus (SE)

TARGET POPULATION

Children and adolescents (age 1 month to 19 years) with status epilepticus

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnostic Assessment

1. Blood cultures (considered, but not routinely recommended)
2. Lumbar puncture (considered, but not routinely recommended)
3. Blood antiepileptic drug levels
4. Toxicology testing
5. Testing for inborn errors of metabolism
6. Genetic testing (considered, but not routinely recommended)
7. Electroencephalography
8. Computed tomography
9. Magnetic resonance imaging

MAJOR OUTCOMES CONSIDERED

Diagnostic yield of the data:

- Incidence of positive blood cultures
- Incidence of central nervous system (CNS) infection
- Antiepileptic drug levels
- Incidence of toxin ingestion
- Incidence of metabolic disorders
- Differential diagnosis of generalized or focal convulsive status epilepticus (SE), nonconvulsive SE, and pseudoseizures
- Incidence of structural CNS lesions found on neuroimaging

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A literature search was conducted through the library of the University of Minnesota, and MEDLINE, for English-language articles from 1970 to 2005 and yielded 1,609 articles. The search terms were as follows: status epilepticus (SE) and, children and, magnetic resonance imaging (MRI), cranial computed tomography (CT) scan, lumbar puncture, spinal tap, electrolytes, metabolic studies, inborn errors of metabolism, electroencephalogram (EEG), hyponatremia, hypokalemia, hypocalcemia, hypoglycemia, acidosis, alkalosis, azotemia, hypophosphatemia, hypomagnesemia, pleocytosis, toxicology, intoxication. Seizures occurring in neonates less than 1 month of age were excluded, as these are defined as neonatal seizures and are different in cause and prognosis. The upper age limit was 19 years. Only articles reporting studies with more than 20 patients were included in this review. Articles consisting of single patient case reports or small samples of unusual pathologic findings, that would have biased the analysis, or articles that referred specifically to febrile or refractory SE, were excluded. Febrile SE and refractory SE were excluded because each is a selected population. Twenty-five articles were identified and reviewed for preparation of this Parameter. Relevant position papers from professional organizations were also reviewed.

Individual committee members reviewed titles and abstracts for content and relevance. Those papers dealing with diagnostic assessments of SE were selected for further detailed review. Bibliographies of the articles cited were checked for additional pertinent references.

NUMBER OF SOURCE DOCUMENTS

Twenty-five articles were identified and reviewed for preparation of this Parameter. Relevant position papers from professional organizations were also reviewed.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Class I. A statistical,[1] population-based[2] sample of patients studied at a uniform point in time (usually early) during the course of the condition. All patients undergo the intervention of interest. The outcome, if not objective,[5] is determined in an evaluation that is masked to the patients' clinical presentations.

Class II. A statistical, non-referral-clinic-based[3] sample of patients studied at a uniform point in time (usually early) during the course of the condition. Most (>80%) patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentations.

Class III. A selected, referral-clinic-based[4] sample of patients studied during the course of the condition. Some patients undergo the intervention of interest. The outcome, if not objective,[5] is determined in an evaluation by someone other than the treating physician.

Class IV. Expert opinion, case reports or any study not meeting criteria for class I to III.

Notes: (1) Statistical sample: a complete (consecutive), random or systematic (e.g., every third patient) sample of the available population with the disease; (2) Population-based: The available population for the study consists of all patients within a defined geographic region; (3) Non-referral-clinic-based: The available population for the study consists of all patients presenting to a primary care setting with the condition; (4) Referral-clinic-based: The available population for the study consists of all patients referred to a tertiary care or specialty setting. These patients may have been selected for more severe or unusual forms of the condition and thus may be less representative; (5) Objective: An outcome measure that is very unlikely to be affected by an observer's expectations (e.g., determination of death, the presence of a mass on head computed tomography [CT], serum B12 assays).

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Each of the selected articles was reviewed, abstracted, and classified by at least two committee members. Abstracted data included the number of patients, total episodes of status epilepticus (SE) (if given), ages, nature of subject selection, case-finding methods (prospective, retrospective, or referral), inclusion and exclusion criteria, classification, etiology, and the results of laboratory, electroencephalogram (EEG), or neuroimaging tests. A four-tiered classification scheme for determining the validity of studies on yield of established diagnostic and screening tests developed by the Quality Standards Subcommittee was utilized as part of this assessment. Depending on the strength of this evidence, it was decided whether specific recommendations could be made, and if so, the level of strength of these recommendations. Evidence pertinent to each diagnostic test together with the committee's evidence-based recommendations is presented.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Recommendations included in this Parameter were based on review of data regarding the following tests for children presenting in status epilepticus (SE): 1) blood culture and lumbar puncture (LP) studies; 2) antiepileptic drug (AED) levels; 3) toxicology screening; 4) metabolic and genetic studies; 5)

electroencephalogram (EEG); and 6) neuroimaging including computed tomography (CT) and magnetic resonance imaging (MRI).

Most available literature did not specify whether the diagnostic tests analyzed were uniformly applied during each SE episode. Therefore, where reported data were missing, a minimum diagnostic yield for each test was calculated by dividing the total number of positive diagnostic tests reported by the total number of reported SE episodes from each study (therefore assuming that each diagnostic test was performed for each episode of SE, likely leading to an underestimate of the true diagnostic yield of these tests).

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

A = Established as effective, ineffective, or harmful for the given condition in the specified population. (Level A rating requires at least two consistent Class I studies.)

B = Probably effective, ineffective, or harmful for the given condition in the specified population. (Level B rating requires at least one Class I study or at least two consistent Class II studies.)

C = Possibly effective, ineffective, or harmful for the given condition in the specified population. (Level C rating requires at least one Class II study or two consistent Class III studies.)

U = Data inadequate or conflicting; given current knowledge, test is unproven.

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Drafts of the guideline have been reviewed by at least three American Academy of Neurology (AAN) committees, a network of neurologists, Neurology peer reviewers, and representatives from related fields.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions of the strength of the recommendations (A, B, C, U) and classification of the evidence (Class I through Class IV) are provided at the end of the "Major Recommendations" field.

Laboratory Studies

Should Blood Cultures and Lumbar Puncture (LP) Be Routinely Done in Children with Status Epilepticus (SE)?

Recommendations

1. There are insufficient data to support or refute whether blood cultures should be done on a routine basis in children in whom there is no clinical suspicion of infection (Level U).
2. There are insufficient data to support or refute whether LP should be done on a routine basis in children in whom there is no clinical suspicion of a central nervous system (CNS) infection (Level U).

Should AED Levels Be Routinely Obtained in Children Taking AEDs Who Develop SE?

Recommendation

1. AED levels should be considered when a child with epilepsy on AED prophylaxis develops SE (Level B, class II and III evidence).

Should Toxicology Testing Be Routinely Ordered in Children with SE?

Recommendation

1. Toxicology testing may be considered in children with SE, when no apparent etiology is immediately identified, as the frequency of ingestion as a diagnosis was at least 3.6% (Level C, class III evidence). To detect a specific ingestion, suspected because of the clinical history, it should be noted that a specific serum toxicology level is required, rather than simply urine toxicology screening.

Metabolic and Genetic Testing

Should Testing for Inborn Errors of Metabolism or Genetic (Chromosomal or Molecular) Studies Be Routinely Ordered in Children with SE?

Recommendations

1. Studies for inborn errors of metabolism may be considered when the initial evaluation reveals no etiology, especially if there is a preceding history suggestive of a metabolic disorder (Level C, class III evidence). The specific studies obtained are dependent on the history and the clinical examination. There is insufficient evidence to support or refute whether such studies should be done routinely (Level U).
2. There are insufficient data to support or refute whether genetic testing (chromosomal or molecular studies) should be done routinely in children with SE (Level U).

Electroencephalography (EEG)

Should an EEG Be Routinely Performed in the Evaluation of a Child with SE?

Recommendations

1. An EEG may be considered in a child presenting with new onset SE as it may determine whether there are focal or generalized abnormalities that may influence diagnostic and treatment decisions (Level C, class III evidence).
2. Although nonconvulsive SE (NCSE) occurs in children who present with SE, there are insufficient data to support or refute recommendations regarding whether an EEG should be obtained to establish this diagnosis (Level U).
3. An EEG may be considered in a child presenting with SE if the diagnosis of pseudostatus epilepticus is suspected (Level C, class III evidence).

Neuroimaging

Should Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) Be Performed in Children with SE?

Recommendations

1. Neuroimaging may be considered for the evaluation of the child with SE if there are clinical indications or if the etiology is unknown (Level C, class III evidence). If neuroimaging is done, it should only be done after the child is appropriately stabilized and the seizure activity controlled.
2. There is insufficient evidence to support or refute recommending routine neuroimaging (Level U).

Definitions:

Classification Scheme for Determining the Yield of Established Diagnostic and Screening Tests

Class I. A statistical,[1] population-based[2] sample of patients studied at a uniform point in time (usually early) during the course of the condition. All patients undergo the intervention of interest. The outcome, if not objective,[5] is determined in an evaluation that is masked to the patients' clinical presentations.

Class II. A statistical, non-referral-clinic-based[3] sample of patients studied at a uniform point in time (usually early) during the course of the condition. Most (>80%) patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentations.

Class III. A selected, referral-clinic-based[4] sample of patients studied during the course of the condition. Some patients undergo the intervention of interest. The outcome, if not objective,[5] is determined in an evaluation by someone other than the treating physician.

Class IV. Expert opinion, case reports or any study not meeting criteria for class I to III.

Notes: (1) Statistical sample: a complete (consecutive), random or systematic (e.g., every third patient) sample of the available population with the disease; (2) Population-based: The available population for the study consists of all patients within a defined geographic region; (3) Non-referral-clinic-based: The available population for the study consists of all patients presenting to a primary care setting with the condition; (4) Referral-clinic-based: The available population for the study consists of all patients referred to a tertiary care or specialty setting. These patients may have been selected for more severe or unusual forms of the condition and thus may be less representative; (5) Objective: An outcome measure that is very unlikely to be affected by an observer's expectations (e.g., determination of death, the presence of a mass on head computed tomography [CT], serum B12 assays).

Strength of Recommendations

A = Established as effective, ineffective, or harmful for the given condition in the specified population. (Level A rating requires at least two consistent Class I studies.)

B = Probably effective, ineffective, or harmful for the given condition in the specified population. (Level B rating requires at least one Class I study or at least two consistent Class II studies.)

C = Possibly effective, ineffective, or harmful for the given condition in the specified population. (Level C rating requires at least one Class II study or two consistent Class III studies.)

U = Data inadequate or conflicting; given current knowledge, test is unproven.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate diagnostic assessment of children with status epilepticus

POTENTIAL HARMS

Not stated

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- This statement is provided as an educational service of the American Academy of Neurology (AAN). It is based on an assessment of current scientific and clinical information. It is not intended to include all possible proper methods of care for a particular neurologic problem or all legitimate criteria for choosing to use a specific procedure. Neither is it intended to exclude any reasonable alternative methodologies. The AAN recognizes that specific patient care decisions are the prerogative of the patient and the physician caring for the patient, based on all of the circumstances involved.
- The classification scheme developed by the Quality Standard Subcommittee (QSS) for studies related to determining the yield of established diagnostic and screening tests or interventions and is appropriate only when the diagnostic accuracy of the test or intervention is known to be good. Additionally, the abnormality potentially identified by the screening intervention should be treatable or, should have important prognostic implications. This classification is different than others currently recommended by the QSS that have been published in recent parameters that relate to diagnostic, prognostic or therapeutic studies.
- It is now common practice to obtain a complete blood count (CBC) and chemistry profiles routinely in children presenting with status epilepticus (SE). Thus, the guideline developers did not develop evidence-based recommendations for these tests but did include in appendix 4 of the original guideline document a summary of previous studies regarding their diagnostic yield. Electrolyte (e.g., Na++ or other electrolytes, Ca++, glucose) abnormalities or basic metabolic disorders were reported in an average of 6% (range 1 to 16%) of children with SE. In most studies these abnormalities were listed as the etiology. However, it was unclear whether these abnormalities were responsible for the episode of SE and if correction resulted in cessation of SE.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Patient Resources
Quick Reference Guides/Physician Guides

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better
Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Riviello JJ Jr, Ashwal S, Hirtz D, Glauser T, Ballaban-Gil K, Kelley K, Morton LD, Phillips S, Sloan E, Shinnar S, American Academy of Neurology Subcommittee, Practice Committee of the Child Neurology Society. Practice parameter: diagnostic assessment of the child with status epilepticus (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society. Neurology 2006 Nov 14;67(9):1542-50. [64 references] PubMed

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006 Nov

GUIDELINE DEVELOPER(S)

American Academy of Neurology - Medical Specialty Society
Child Neurology Society - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Neurology (AAN)

GUIDELINE COMMITTEE

Quality Standards Subcommittee
Practice Committee of the Child Neurology Society

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Quality Standards Subcommittee Members: Jacqueline French, MD, FAAN (Co-Chair); Gary S. Gronseth, MD (Co-Chair); Charles E. Argoff, MD; Stephen Ashwal, MD, FAAN (ex-officio) (facilitator); Christopher Bever, Jr., MD, MBA, FAAN; John D. England, MD, FAAN; Gary M. Franklin, MD, MPH (ex-officio); Gary H. Friday, MD, MPH, FAAN; Larry B. Goldstein, MD, FAAN; Deborah Hirtz, MD (ex-officio); Robert G. Holloway, MD, MPH, FAAN; Donald J. Iverson, MD, FAAN; Leslie A. Morrison, MD; Clifford J. Schostal, MD; David J. Thurman, MD, MPH; William J. Weiner, MD, FAAN; Samuel Wiebe, MD

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

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ENDORSER(S)

American Academy of Pediatrics - Medical Specialty Society
American College of Emergency Physicians - Medical Specialty Society
American Epilepsy Society - Disease Specific Society

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: A list of American Academy of Neurology (AAN) guidelines, along with a link to a Portable Document Format (PDF) file for this guideline, is available at the AAN Web site.

Print copies: Available from the AAN Member Services Center, (800) 879-1960, or from AAN, 1080 Montreal Avenue, St. Paul, MN 55116.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- AAN guideline development process [online]. St. Paul (MN): American Academy of Neurology. Available from the American Academy of Neurology Web site.
- Diagnostic assessment of the child with status epilepticus. AAN summary of evidence-based guideline for clinicians. St. Paul (MN): American Academy of Neurology. 2 p. Available in Portable Document Format (PDF) from the AAN Web site. See the related QualityTools summary.

PATIENT RESOURCES

The following is available:

- Diagnosing the cause of status epilepticus in children. AAN guideline summary for patients and their families. St. Paul (MN): American Academy of Neurology (AAN). 2 p.

Electronic copies: Available in Portable Document Format (PDF) from the AAN Web site. See the related QualityTools summary.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

NGC STATUS

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